

## **RCDs**

RCDs (Residual Current Devices) are electrical safety switches that remove the supply to an electrical circuit; RCDs have a similar purpose and role to fuses. When an RCD detects the electrical flow into a circuit is not the same as the flow out it opens a switch ('throws' the switch) and disconnects the supply to a circuit.

Many electrical problems are solved by 'resetting the RCD'.

The image below shows an RCD.



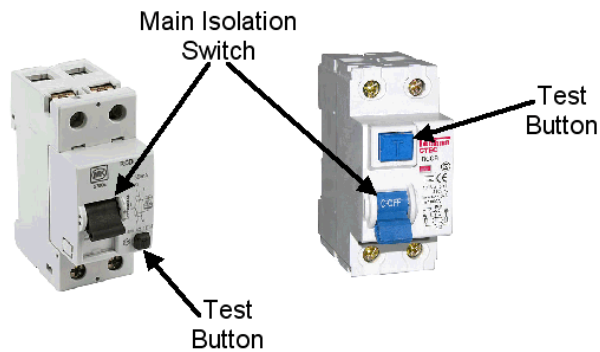
An RCD domestic unit is a box that contains a multiple RCDs; each RCD protects a single circuit.

The image below shows an RCD domestic unit.



There are different designs of RCD but they all look similar and will have at least two switches; one switch that connects/isolates the electrical circuit and a test switch (or button). Pushing the test switch (or button) causes the RCD to 'throw' the main isolation switch and isolate the electrical circuit.

The image below shows two different RCDs.



RCDs detect differences in electrical flow between the live and neutral lines in an electrical circuit and open (disconnect the supply) when the imbalance is too big.

A basic principle of any electrical circuit, or appliance, is 'what goes in must come out'; electrical flow in equals electrical flow out.

There are 3 'lines' in a domestic electrical supply – Live, Neutral and Earth. Electricity flows into a circuit on the live line and out on the neutral line.

An appliance, for instance a kettle or TV, is an electrical circuit; electricity flows into an appliance on the live line and out on the neutral line.

The earth line is a 'safety line'; the earth line connects to different parts of an appliance, or circuit, to ensure that they do not become 'live'. The earth line connects to places that people touch, for instance the metal casing of a kettle.

Faults inside an appliance can cause the live line to become connected to the earth line. If the live line connects to the earth line, this means the live line also connects to anything that connects to the earth line, for instance the metal casing of a kettle – this is dangerous.

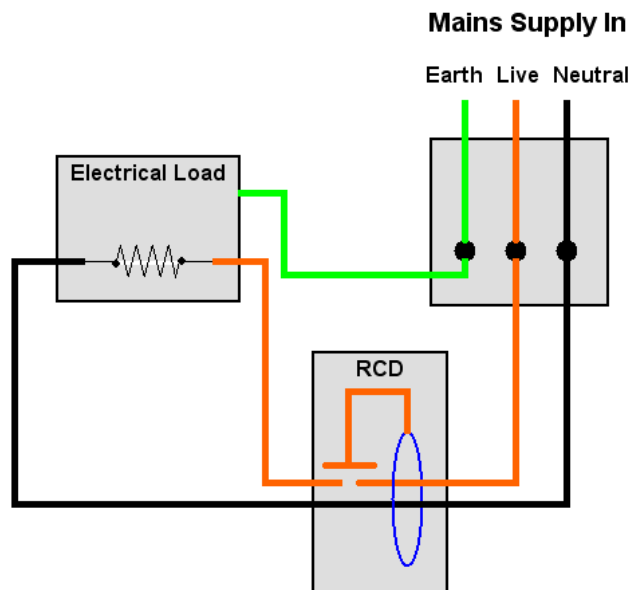
An RCD checks the difference in electrical flow between the live and neutral lines – the flow should be the same – what goes in must come out.

If there is a difference between the electrical flow in on the live line and out on the neutral line something is wrong; the electricity is flowing out of the circuit somewhere, but where?

The most likely answer is the electricity is flowing out on the earth line, why would this happen? The probable cause is the live line is connected to the earth line because of a fault, maybe a loose or damaged wire. This is dangerous and can cause an electric shock if someone touches the earth line or something that connects to the earth line, for instance the metal casing of a kettle.

The RCD detects the imbalance in electrical flow and opens; the RCD removes the supply from the circuit, the potential danger has been removed.

The image below shows a diagram of an electrical circuit with an RCD.



The box marked 'Electrical Load' could be any appliance, for instance a TV, kettle or PC.

The RCD monitors (the blue circle) the current flowing in on the Live line and out on the Neutral line, if they are the same the switch in the RCD is made – it connects the Live line to the electrical load.

If the current is not the same on the Live and Neutral lines the switch in the RCD is not made and the Live line is disconnected from the electrical load.

The switch is currently 'not made' – the electrical load is not connected to the electrical supply.